

NOISE REDUCTION IN POWDER COATING PLANT THROUGH AQUA SILENCER

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Abstract

This paper chiefly centers around the lessening of commotion level in assembling region of paint industry. Noise control has after some time ended up being substantially more in fact upgraded and powerful. Amid the study of various paint producing territory of plant at one of the paint business in Bangalore the real noise source was from powder covering plant, estimating the commotion level came to know it had higher than the admissible level of industry which influenced the administrators and in addition the workplace. The conceivable foundations for the commotion are distinguished and noise lessening gadget (water silencer) and other general measures are recommended which will decrease the noise to least.

Introduction

One of the critical issues of noise source is mechanical commotion. The universally handy impact of mechanical noise on the physical state of workers has been a subject of level headed discussion among researchers. These enterprises contain a heaps of gadgets and machines that deliberate as a wellspring of commotion such an engines, compressors, electrical machines, inward burning motors, rotors, cutting machines, boring, pounding, fans and move assets. The commotion level produce depends for the most part on the kind of the noise premise, for example, the sort of gear, separation from the premise to the laborer or earpiece and the idea of the workplace. Accordingly the specialists of hand apparatus mechanical are revealed to the noise levels damage as far as possible. High noise contacts in businesses influences the correspondence among the laborers, as well as prompt the other mental and physiological impacts on the representatives. Our work is to gauge the noise level in the paint fabricating zone by thinking about the distinctive situations and at better places. As indicated by the OSHA norms the allowable presentation restrain for human ear ought not surpass 85dB. In view of our study the noise level estimated by sound level meter is above admissible introduction restrain.

Literature Review

The importance of the relationship between noise at workplace and workers health, particularly hearing loss has been described in previous studies. Lumber and wood, textile, petroleum, utility, metal, print and paper industries were with the highest percentage of

Exposure time (hour)	Limits in dB [A]
8	85
4	93
2	96
1	99
1/2	102
1/8	108
1/32 or less than 2 min	114

workers exposed to noise of 85 dB(A) or higher. OSHA rates noise induced hearing loss as one of the work-related problems involving 11 million workers in the USA. According to OSHA standards, Twenty two million labours are exposed to potentially harmful noise at job each year. Last year, U.S trade have paid more than \$1.5 million in penalty for not defending workforce from noise .An approximate \$242 million is exhausted annually on workforce recompense for hearing disability.

Aim

This paper aims to reduce the overall noise level of the powder coating plant at Akzonobel India Limited.

Objectives

- Study the actual noise level of the machines using noise measuring devices (Sound level meter).
- Analyzing the measured noise level and comparing it with standards to identify the causes for noise.
- Reducing noise level of the powder coating plant by implementing the engineering measures.
- To implement the required measures using damping devices based on standards and comparison.
- To provide safety measures which will help the human resources to work in stress free environment and safely

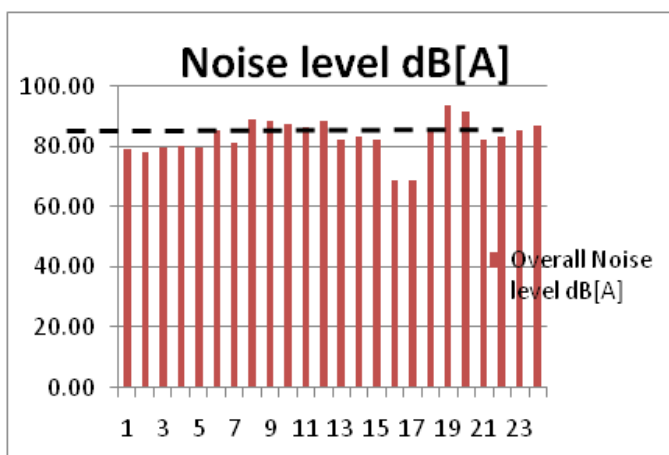
Methodology

Work environment noise influences the human body in different ways. The most surely understood is hearing misfortune; however work in a loud situation likewise can have different impacts. Despite the fact that noise prompted hearing misfortune is chiefly normal word related sickness, it is regularly uncared for on the grounds that there are no perceptible impacts. It more often than not creates over a drawn out stretch of time, and, with the exception of in extremely uncommon cases, there is no torment. What occurs is a dynamic loss of correspondence, socialization, and responsiveness to the earth. In its beginning times (when hearing misfortune is over 2,000 Hz), it influences the capacity to comprehend or segregate discourse. As it advances to the lower frequencies, it starts to influence the capacity to hear sounds by and large. Presentation to elevated amounts of noise can cause changeless hearing misfortune. Neither surgery nor a portable amplifier can enable right this to sort of hearing misfortune.

Variation of Noise Level in Powder Coating Plant

Sl. No.	Location	Min noise dB[A]	Max noise dB[A]	Avg dB[A]	Comments
1	Holding area	78.40	80.10	79.25	Below PEL
2	In front of Dongui mixture 1	76.60	80.30	78.45	Below PEL
3	In front of Dongui mixture 2	77.60	82.50	80.05	Below PEL
4	Dosing station	78.80	82.20	80.50	Below PEL
5	ZSK-43	79.50	80.60	80.05	Below PEL
6	Back of PCS-70	83.00*	87.90*	85.45*	Above PEL*
7	Back of PICKRD	81.10	82.10	81.60	Below PEL
8	In front of PICKRD	88.30*	88.30*	88.30*	Above PEL*
9	Back of FEROLI	85.00*	92.00*	88.50*	Above PEL*
10	In front of FEROLI	86.80*	88.80*	87.80*	Above PEL*
11	Center of plant	82.00*	90.90*	86.45*	Above PEL*
12	Ground floor under ICM-2	87.10*	90.10*	88.60*	Above PEL*
13	Dust collector 2(Ground floor)	80.00	84.50	82.25	Below PEL
14	Packing line	80.20	86.20	83.20	Below PEL
15	Inside QC lab	68.00	70.00	69.00	Below PEL
16	Inside spray booth	68.00	70.20	69.10	Below PEL
17	Dust collector 3(1st floor)	85.00*	87.30*	86.15*	Above PEL*
18	ICM 3 (1st floor)	92.00*	95.60*	93.80*	Above PEL*
19	ICM 2 (1st floor)	91.00*	92.00*	91.50*	Above PEL*
20	ICM 1 (1st floor)	81.00	83.30	82.15	Below PEL
21	CMT 5(1st floor)	82.50	84.30	83.40	Below PEL
22	ICM 38 (Ground floor)	83.30*	87.80*	85.55*	Above PEL*
23	ICM 38(1st floor)	84.40*	89.20*	86.80*	Above PEL*
24	Charging Hood	78.10	81.20	79.65	Below PEL

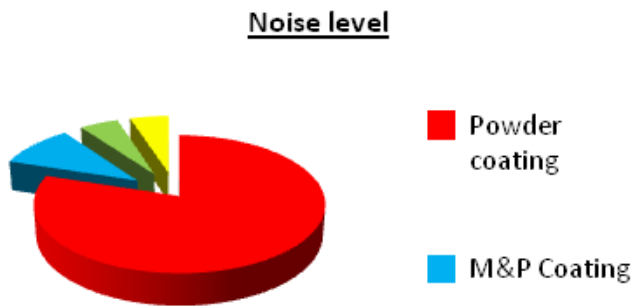
Figure 1 Variation of noise level in powder coating plant



Note

The above chart shows the variation of noise level in Powder Coating Plant. X- axis represent the operator area of specific machines mentioned in the chart: and Y-axis represent the various noise level in dB (A).

Figure 2 Noise level comparison of all the 4 plants

**Note**

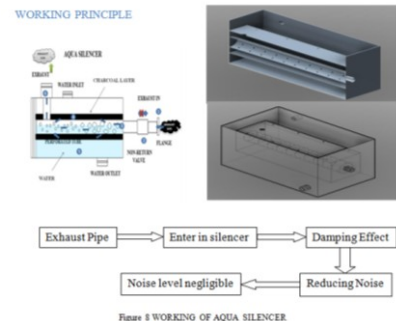
By comparing the Noise level it can be observed from the pie chart that, the maximum noise is from Powder Coating plant. Hence Powder Coating Plant is mainly concentrated for further analysis.

Discussion

After coupling the pipe the noise level was reduced only by 9.4 dB [A]. Hence

Aqua silencer is suggested which helps to reduce more percentage of noise.

An Aqua silencer is used to control the noise. This is mainly due to presence of sprockets in water molecules, which lowers its amplitude and thus, lowers the sound level.

**Results****Noise level of Powder Coating after Few Implementation**

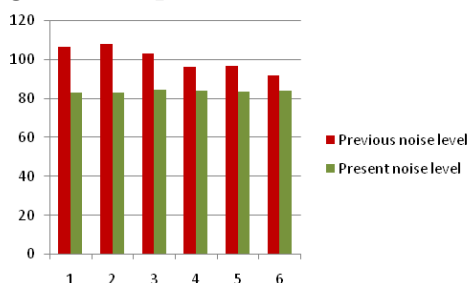
SI No	Location	Noise(1 Feet)	Noise(3 Feet)	Avg noise	Comments
(ON 28TH FEB 2017 AT 11:15AM) Full load 2200rpm					
1	CMT 5 under conical feed	92.30	87.00	89.65	Above PEL*
2	CMT 5 (when conical feed closed)	101.90	98.80	100.35	Above PEL*
3	CMT 5 (when square feed closed)	90.00	88.00	89.00	Above PEL*
4	CMT 5 (1st floor)	88.00	89.10	88.55	Above PEL*
5	CMT 5 (near PPS motor)	93.40	90.00	91.70	Above PEL*
6	CMT 5 (operator area)	93.00	91.20	92.10	Above PEL*

Table Noise level of Powder Coating after few implementation

Note Permissible Exposure limit working 8 hrs a day is above standards (85 dB [A])

Comparison of Previous and Present Noise level of CMT machine in Powder Coating Plant

Figure 3 Comparison of Previous and Present Noise level of CMT machine in Powder



Coating Plant

Scale

X axis: Various parts of CMT machine

Y axis: Noise level in dB [A] at various places of CMT 5 machine

Conclusion

- This paper has dissected the substance of noise level when rolling out a few improvements and it was seen that there is significant contrast in the level of commotion level, and for encourage more decrease we have recommended few cures which can at present more diminish the noise level at the working spot and make it appropriate for working with calm condition.
- By actualizing successful control measures for noise levels , we can lessen the commotion level at the source and improve the earth put for representatives.
- It is watched that the water silencer is best in decrease of outflow of gases . By utilizing water as a medium, commotion level is diminished.
- The commotion lessening and its compelling control with wellbeing measures makes the workplace safe and calm. vague indistinct

References

1. P. Balashanmugam, G.Balasubramanian," Developments of Emission and Noise Control Device (Aqua Silencer)"; Scientific Journal Impact Factor (SJIF): 1.711International Journal of Modern Trends in Engineering and Research.
2. Bauer P, Körpert K, Neuberger M, Raber A, Schwetz F International journal of science technology and management. Vol. No.5, Issue. No 03 March 2016. www.ijstm.com
3. Madbuli H. Noweir Abdullah O. Bafail Ibrahim M. Jomoah International Journal of Engineering and Innovative Technology (IJEIT) Volume 5, Issue 11, May 2016. www.ijeit.com
4. Noise control manual by Masoneilan for aerodynamic noise & hydrodynamic noise bulletin OZ3000 01/02
5. Dharmeshkumar Parmar, Firoj H Pathan, "Reduction of air & noise pollution by aqua silencer", International journal of advance research in engineering, science & technology: Volume 4, issue 2, feb 2017.
6. Noweir MH, Jamil AT. Noise pollution in textile, printing, and publishing industries in Saudi Arabia. Environment Assess. 2003; 83(1):103–11